

IN THE CLAIMS

What claimed is:

1. A linear steering truck apparatus, for mounting upon a railroad car body,
the linear steering truck apparatus being of the kind having at least two transversely
5 extending axles, and each axle being pivotably mountable to the railroad car body, the
linear steering truck apparatus having a longitudinally extending axis in the direction of
travel of the truck when the truck is traveling in a straight line, the linear steering truck
apparatus further having a transverse axis extending generally perpendicular to the
longitudinal axis, the transverse axis being positioned at a midpoint along the
10 longitudinal axis, the linear steering truck apparatus comprising:
 - a. a bolster member having two ends, the bolster being located along the
transverse axis extending generally perpendicular to the longitudinal axis, generally
located between and parallel to the transversely extending axles;
 - b. a means for attaching the linear steering truck to the car body;
 - 15 c. a plurality of pedestals, a pedestal engaged to an axle bearing, the axle
bearing being rotationally engaged to one end of a transversely extending axle, and at
least one pedestal being movably attached to at least one other pedestal situated in the
same plane along the longitudinal axis; and
 - d. a means for performing car body steering, wherein the geometry of pivot
20 points from one axle to the bolster form a trapezoid and the geometry of pivot points
from another axle to the bolster form a parallelogram, the pedestals being pivotably
connected so that a lateral force at one axle is reacted by the other axle, wherein the car

body mass acts as a pendulum mass restoring force, and the apparatus being steered to the center of the track with either end of the truck leading after the trapezoid side yaws.

2. The apparatus of claim 1 wherein the means for attaching the linear steering truck to the car body includes a plurality of side bearings.

5 3. The apparatus of claim 2 wherein the side bearings are situated proximate to one end of the bolster, the side bearing having a roller situated between the bolster and a car body plate, wherein the car body is placed on the side bearing.

4. The apparatus of claim 3 wherein the roller is conical in shape.

5. The apparatus of claim 1 wherein the bolster and pedestal are constructed
10 of high strength ferrous casting.

6. The apparatus of claim 1 wherein the bolster and pedestal of high strength ferrous casting are constructed using the lost foam process.

7. The apparatus of claim 1 wherein a bearing adapter movably attaches a pedestal to an axle bearing.

15 8. The apparatus of claim 7 wherein the bearing adapter has an outer race, a resilient member, a ball bearing cage assembly, and an inner race, said outer race having a spherical and first interlocking interface, the first interlocking interface movably attaching to a second interlocking interface of one end of a pedestal, said ball bearing cage assembly having a top spacer, a bottom spacer, a cage, a plurality of ball bearings,
20 and an assembly fastener, the assembly fastener connecting the top and bottom spacers thereby sealing the cage and the plurality of bearings within the top and bottom spacers, said ball bearing cage assembly being located between the outer race and inner race, said resilient member attaching the outer race to the inner race, said inner race having an

interface with the axle bearing, the interface allowing the pedestal to pivotably attach to the axle bearing while allowing for yaw and roll freedom thereby providing a normal force on the axle bearing for lateral and longitudinal loads and eliminates moment on the axle bearing.

5 9. The apparatus of claim 8 wherein the outer race and inner race are constructed of high strength ferrous.

 10. The apparatus of claim 9 wherein the outer race and inner race are constructed of high strength ferrous casting using the lost foam process.

 11. The apparatus of claim 8 wherein the top spacer and bottom spacer are
10 constructed of ultra-high molecular weight, high temperature polyethylene.

 12. The apparatus of claim 8 wherein the plurality of ball bearings comprise a plurality of 1 ½ in. diameter ball bearings.

 13. The apparatus of claim 1 wherein an equalizing side frame suspension moveably attaches at least one pedestal to at least one other pedestal situated in the same
15 plane along the longitudinal axis.

 14. The apparatus of claim 13 wherein the equalizing side frame suspension having a housing, the housing having a rear suspension retainer, a resilient member, a viscous damper, a spring and damper retainer, the equalizing side frame suspension further having a non-linear force equalizer and a rolling universal joint, wherein a rear
20 suspension retainer fixedly attaches within the housing, a first end of a resilient member being positioned adjacent the rear suspension retainer and a second end of the resilient member being positioned adjacent a spring and damper retainer, the resilient member having a passage, the viscous damper being located within the passage, a first end of the

viscous damper movably attaching to the rear suspension retainer and a second end of the viscous damper movably attaching to a spring and damper retainer, a first end of the non-linear force equalizer being movably attached to the spring and damper retainer and a second end of the non-linear force equalizer being movably attached to a first end of the rolling universal joint, the second end of the rolling universal joint being movably attached to a pedestal, wherein the equalizing side frame suspension provides for equalization of load at each wheel connected to a pedestal and further provides for absorbance of vertical bounce energy experienced by the wheels and pedestals.

15. The apparatus of claim 14 wherein the rolling universal joint being movably connected to a pedestal, the rolling universal joint having a top section, a bottom section, an inner section, and a plurality of assembly resilient members, the inner section being movably attached between the top section and bottom section, the top section being connected to the bottom section by assembly resilient members, whereby the inside section allows lateral movement of the rolling universal joint and the top section and bottom section provide for longitudinal movement of the rolling universal joint, wherein the weight of the equalizing side frame suspension aligns the rolling universal joint to the pedestal, thereby preventing bending force and uneven wear on the joint.

16. The device of claim 14 wherein the housing, rear suspension retainer, and spring and damper retainer are constructed of high strength ferrous casting.

17. The apparatus of claim 16 wherein the housing, rear suspension retainer, and spring and damper retainer of high strength ferrous casting are constructed using the lost foam process.

18. The apparatus of claim 1 wherein the means for performing car body steering comprises a steering component.

19. The apparatus of claim 18 wherein the steering component has a rack and pinion steering component comprising a gear tray, a pinion, an idler, a plurality of racks, the gear tray having a recess, the pinion rotationally engaging the gear tray recess and having a pinion recess, the idler engaging the pinion recess, one of said racks engaging the gear tray, one of said racks engaging the pinion, and one of said racks engaging the idler, a first pedestal rotationally attaching to the rack on the pinion, a second pedestal rotationally attaching to the rack on the gear tray and to the rack on the idler, the pinion being rotationally attached to a car body plate, whereby as a rail turns out from under the car body, yawing of a wheel-set due to cone shape of wheels, one wheel radius becomes smaller and one larger, thereby allowing the steering system to move in the direction of the turn to accurately steer each axle, rotation of one pinion pulls the pedestal and wheel in on one side and pushes the pedestal and wheel out on the other, the bolster moves in the opposite direction from the pinion by the pinion translating across the bolster, in response the pedestals and wheels attached to the bolster at the gear set tray are pulled in on one side, and the pedestals and wheels attached to the bolster at the gear set tray on the other side are pushed out, thereby allowing the idlers to roll freely supporting the other side of the pedestals.

20. The device of claim 19 wherein the gear tray, pinion, idler and racks are constructed of high strength ferrous casting.

21. The apparatus of claim 20 wherein the gear tray, pinion, idler and racks constructed of high strength ferrous casting are constructed using the lost foam process.

22. The apparatus of claim 18 wherein the steering component comprises a reactive lateral suspension having a selector housing, said selector housing being fixedly secured inside the bolster, the selector housing having a pair of selectors each containing opposing gear faces thereby allowing pivoting of the selectors within the selector housing, the reactive lateral suspension further having a plurality of struts, each strut being movably attached to a selector, a strut of the reactive lateral suspension further being movably attached to a wheel-set bearing of the pedestal, wherein the wheel-set bearing being located above the center of the car body mass such that the reactive lateral suspension absorbs hard stop energy by steering the car back on the center of the track.
23. The device of claim 22 wherein the housing, selectors, and struts are constructed of high strength ferrous casting.
24. The apparatus of claim 23 wherein the housing, selectors, and struts constructed of high strength ferrous casting are constructed using the lost foam process.
25. The apparatus of claim 1 further comprising a means for maintaining full brake shoe contact on a wheel when brakes are applied.
26. The apparatus of claim 25 wherein the means for maintaining full brake shoe contact on a wheel when brakes are applied comprises a strut affixed to the steering component, the strut having joints and a brake guide bracket, the brake guide bracket being capable of receiving a brake beam and a brake shoe, whereby pivoting of the strut about the joints causes the brake shoe to maintain full contact on a wheel upon actuation of the brakes.
27. A bearing adapter apparatus for connecting a pedestal to a wheel-set, the apparatus comprising:

- a. an outer race, at least one resilient member, a ball bearing cage assembly, and an inner race;
- b. said outer race having a spherical and first interlocking interface for providing vertical centering alignment and for movably attaching to a second interlocking interface of one end of a pedestal;
- c. said ball bearing cage assembly having a top spacer, a bottom spacer, a cage, a plurality of ball bearings, and at least one assembly fastener, the at least one assembly fastener connecting the top and bottom spacers thereby sealing the cage and the plurality of bearings within the top and bottom spacers and from the outside environment;
- d. said ball bearing cage assembly being located between the outer race and inner race, said at least one resilient member attaching the outer race to the inner race, thereby allowing yaw and roll freedom while holding the bearing adapter together; and
- e. said inner race providing a conical interface with the axle bearing, thereby allowing the pedestal to pivotably attach to the axle bearing while allowing for yaw and roll freedom which provides a normal force on the axle bearing for lateral and longitudinal loads and eliminates moment on the axle bearing.

28. A linear steering truck apparatus, for mounting upon a railroad car body, the linear steering truck apparatus being of the kind having at least two transversely extending axles, and each axle being pivotably mountable to the railroad car body, the linear steering truck apparatus having a longitudinally extending axis in the direction of travel of the truck when the truck is traveling in a straight line, the linear steering truck apparatus further having a transverse axis extending generally perpendicular to the

longitudinal axis, the transverse axis being positioned at a midpoint along the

longitudinal axis, the linear steering truck apparatus comprising:

- a. a bolster member having two ends, the bolster being located along the transverse axis extending generally perpendicular to the longitudinal axis, generally
5 located between and parallel to the transversely extending axles; and
- b. a plurality of side bearings, a side bearing being situated proximate to one end of the bolster, the side bearing having a plurality of rollers situated between the bolster and a car body plate, wherein the car body plate is placed on the side bearings thereby attaching the apparatus to the car body.

10 29. The apparatus of claim 28 wherein the side bearings are positioned to direct the entire load of the car body equally through the bolster.

 30. The device of claim 28 wherein the bolster and side bearings are constructed of high strength ferrous casting.

 31. The apparatus of claim 30 wherein the bolster and side bearings
15 of high strength ferrous casting are constructed using the lost foam process.

 32. The apparatus of claim 28 wherein the plurality of rollers are conical shaped.

 33. The apparatus of claim 28 wherein the plurality of rollers are radially aligned.